ESP/psi Testing Lamp

Written By: John Iovine

TOOLS:

- Adhesive (1)
- Drill press (1)
- PIC programmer (1)
  if you don't buy the preprogrammed microcontroller
- Sandpaper (1)
  for decorative texturing
- Saw (1)
- Soldering equipment (1)
- Vice (1)

PARTS:

- Geiger-Müller tube (1)
  All parts (materials) are available as a kit from my company, Images SI, at http://imagesco.com/esp.html. I also sell separately the Geiger tube, PCB, case, step-up transformer, and a preprogrammed microcontroller.
- Microcontroller (1)
- Circuit boards (1)
  The kit has custom PCBs, or you can use 2 plain 2"×6" breadboards and insulated hookup wire.
- Case (1)
  The kit includes a transparent cylinder case that fits the PCBs.
- Step-up transformer (1)
- Oscillator (1)
- Hex inverter chip (1)
- Chip sockets (1)
  for PIC and inverter chips
- Switch (1)

- Capacitors (2)
- Capacitors (4)
- Diode (1)
- Diodes (3)
- Diodes (2)
- Diode (1)
- Bridge rectifier (1)
- LEDs (4)
  red, green, blue, yellow (1 each)
- resistors (4)
- Resistor (1)
- Resistor (1)
- Resistor (1)
- Resistor (1)
- Resistor (1)
- Resistor (1)
- Resistor (1)
- Resistor (1)
- Transistor (5)
- Transistor (1)
- Voltage regulator (1)
- Copper foil tape (1)
- 2-conductor jack (1)
  for data out
- DC “wall wart” transformer (1)

SUMMARY

Albert Einstein once wrote that God does not play dice with the universe. To which Niels Bohr (or Enrico Fermi) reportedly replied, “Stop telling God what to do with his dice.”

Here's a mood lamp that expresses these dice as 4 multicolored cubes that blink randomly, with true randomness — not the deterministic, pseudo-random chaos that computers and other closed, logic-based systems produce, but real, nonreplicable randomness, triggered by background radiation from across the universe.

I designed this lamp for testing ESP (extrasensory perception), although it has other fun and interesting applications. At the heart of the device is a mini Geiger counter that detects ionizing radiation from 3 main sources: cosmic radiation from the sun and stars; terrestrial radiation from radioactive elements in the soil, air, and water; and radioactive isotopes in living organisms' bodies, such as potassium-40, carbon-14, and lead-210.

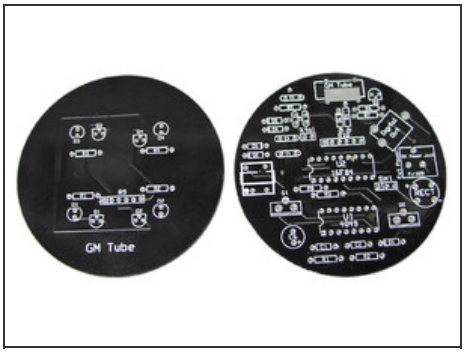
To produce the random numbers, a microcontroller constantly runs through a loop counting from 1 to 4. Whenever the Geiger counter detects a particle, the loop is interrupted and the last number counted indexes to one of the 4 LED cubes. This new cube is lighted, and the counting resumes until the next detection. The algorithm resembles a fast-spinning carnival wheel that's stopped occasionally to read the pointer position, then spun again.

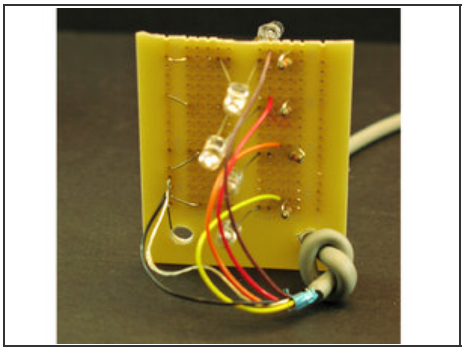
As a result, a new cube on the lamp switches on about once or twice a minute, under normal circumstances. If the same cube lights again, it momentarily blinks off in between. For logging and other uses, the random numbers are also sent to a serial port as TTL data (0V low, 5V high) that can be read by a PC.

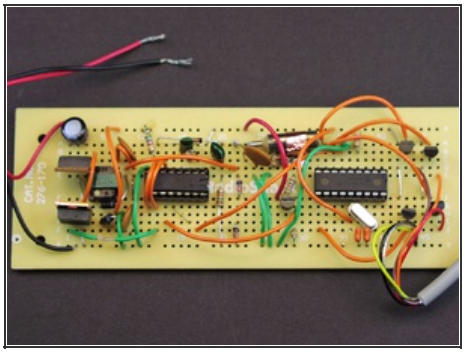
Step 1 — Here's an overview of the circuit.

- The circuit draws power from a 6V–9V DC transformer or a 9V battery. On the logic side of the circuit, a voltage regulator produces 5V DC to supply the chips and LEDs. The other part of the circuit, the detector side, steps the voltage up to the 400V DC needed to power the Geiger tube. A 4049 hex inverter chip is set up to generate a square wave, which drives an IRF830 power MOSFET to switch the current on and off to a mini step-up transformer.
- The transformer's AC output then feeds into a voltage doubler, consisting of 2 high-voltage diodes and 2 high-voltage capacitors, which produces the 400V DC that connects to the anode of the Geiger tube.
- The Geiger tube's cathode connects to ground through a 330kΩ resistor, and a 5.1V Zener diode spans the resistor to limit the tube's pulse output. The output feeds into the base of a 2N3904 transistor, which boosts it and routes it through 2 inverting gates. The inverters momentarily buffer the signal without reversing its polarity, before it continues to the microcontroller's interrupt pin and halts the spinning carnival wheel.
- I built my lamp to run off a wall-wart, but you can also make a portable version that takes a 9V battery, or a lamp that runs both ways. See the schematic notes for details.

Step 2 — Build the circuit.

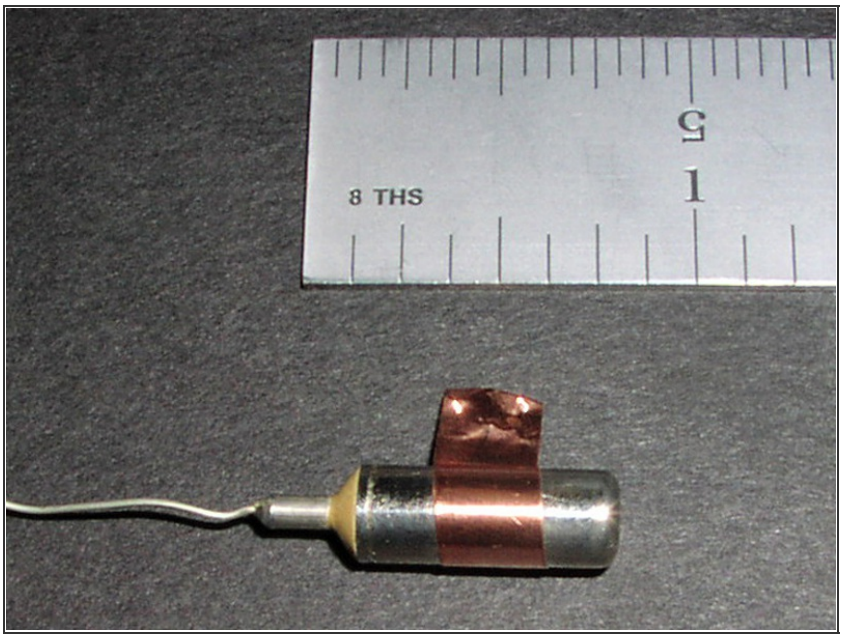






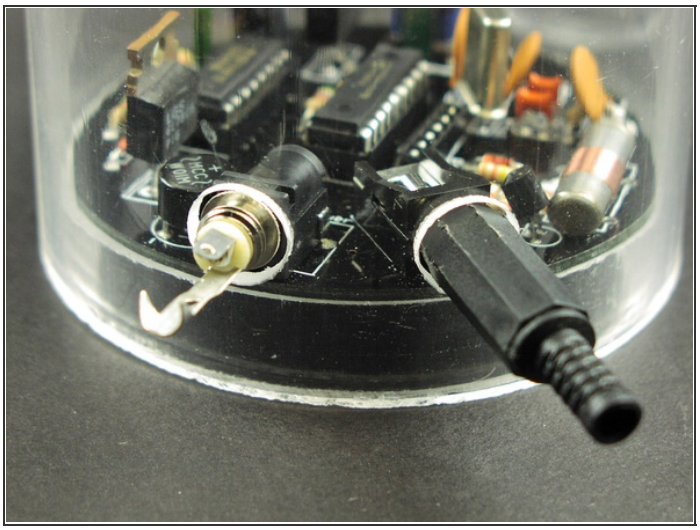
- You can build the ESP Lamp circuit on my kit PCB, which is printed to show which components go where, or else use plain breadboard and follow the online schematic.
- Either way, assemble 2 different boards: a small display board carrying the LEDs, their paired resistors, and the transistors that drive them (2nd photo), and a main circuit board with everything else (3rd photo).
- Connect the 2 boards temporarily just for testing; they'll be stacked in close proximity in the completed lamp, so you may want to shorten the connections later.

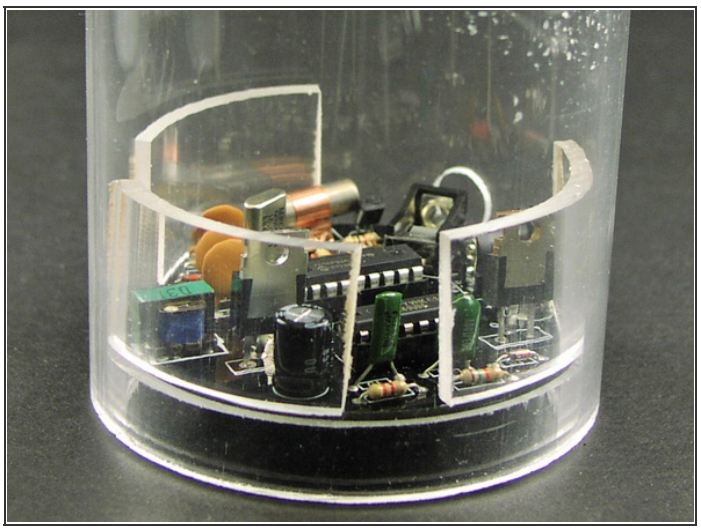
Step 3



- To prepare the Geiger tube's cathode before connection, wrap copper foil tape around the body of the tube. This foil solders to the 330kΩ grounding resistor.
- Solder the sockets in for the PIC microprocessor and 4049 inverter chips so that they can be easily removed — this is especially important for programming the PIC.
- After assembling the electronics, download the hex file from http://makezine.com/21/diyscience_esp and use a PIC programmer to burn it onto the micro-processor.
- Plug in the chip, switch on the power, and watch. When the lamp turns on, it does a self-test, lighting the 4 LEDs in sequence. Then all the LEDs are turned off until the first radioactive particle is detected. If it all works, you're ready to build the case.

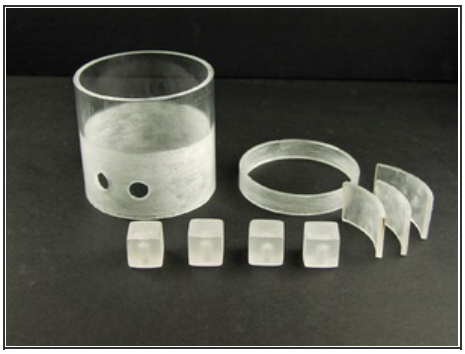
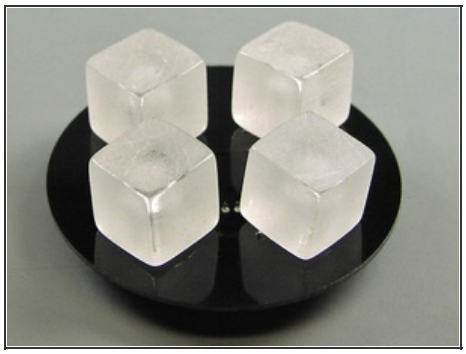
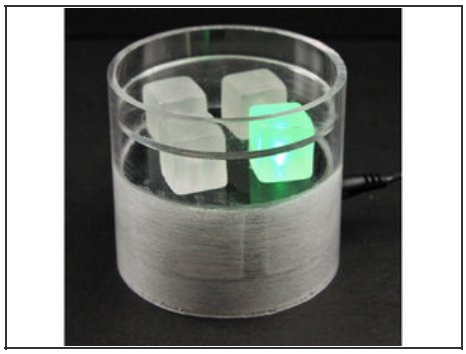
Step 4 — Make the case.





- Before gluing the lamp together, test-fit the case pieces and circuit boards. With the kit case, the small ring piece fits inside the main tube and supports the main PCB.
- Mark positions and drill 3/8" holes for the power plug and data port, if used, leading to their locations on the PCB. You can insert dummy plugs into the jacks to confirm that the holes fit.
- Use a small saw to cut 3 arcs, about 60° each, out of the medium-sized ring. Arrange these arcs as curved spacers around the perimeter of the main board, and stack the display board on top.
- Solder the final connections between the 2 boards if you haven't already, making them short and flexible enough to fit.

Step 5

- Drill each cube halfway through with a ¼" bit, for an LED to fit into. The kit case pieces are made from clear plastic and you can leave them transparent, but I created a frosted effect by texturing the cubes and the surfaces below them with sandpaper and a wire brush.
- The lamp is ready to be glued together. Using clear silicone adhesive, glue the cubes over the LEDs on the display board.
- Glue the main board platform into the main tube and then glue in the board. Glue the spacers to the inside of the tube, and the display board on top.
- Finally, fit the clear plastic top disk over the cubes, finishing off the lamp.

Applications — Radioactivity and Party Games

True random numbers are useful for data encryption, statistical mechanics, probability, gaming, neural networks, and disorder systems, to name a few. Here are some specific applications for the ESP Lamp.

Mood Lamp The lamp's output is unpredictable in both time and color. You can see it as a sophisticated mood lamp, a window into the ramblings of the universe at large, or maybe an example of God talking (if anyone is listening).

Radioactive Fallout Detector Excessive radiation, such as from radioactive fallout, would make the LEDs blink rapidly. Using this same principle, if you wanted to generate random numbers more rapidly than the lamp typically outputs, you could hold a small piece of uranium ore close to the Geiger tube. This will also cause the lamp to blink rapidly and output random numbers.

Precognition Testing Predict the color of the next LED that will light, and track the results. For example, write down what you think the next 60 LED colors will be. Chance alone will average 15 correct hits out of 60 calls, but any number of hits between 9 and 21 hits (2 standard deviations

from chance) is not considered significant. Hit counts above (or below) this range may be showing ESP/psi activity.

Psychokinesis (PK)/Intention Testing Choose a single color to “intend” and write down the next 60 LED colors while mentally trying to get your color to come out. As with precog testing, anything above or below the range 9 to 21 suggests activity. It has been suggested that groups of people all intending the same color have a higher influence rate than individuals, so this could be a game to try at your next party.

Telepathy Testing Two people sit in separate rooms; a sender observes the ESP Lamp and tries to transmit the color changes to the receiver as they occur. The receiver tries to receive the impression from the transmitter and writes down the colors and times.

Telephone to God Use the ESP Lamp as a Magic 8-Ball type of device. Assign values to the colors, like green for yes, red for no, and so on. Ask a question and wait for the reply from the next lit LED. Matthew 10:29 reads, “Not even a sparrow falls to earth without God’s knowing it.” If so, God would know of this telephone and could communicate through it.

Global Consciousness Signal The Global Consciousness Project (see Resources) analyzes randomly generated numbers for significant deviations from randomness, which they reportedly observed during Lady Diana’s funeral and after the 9/11 attacks. The ESP Lamp has a TTL output that can be read by a PC, so software can be written to check whether its output becomes less random, signaling an event, global or local.

Resources

Here are 3 research sites that use statistical tools and random events to assess possible ESP/psi abilities of the human mind:

Psi Arcade: An online intuition game from the Institute of Noetic Sciences (IONS) psiarcade.com Global Consciousness Project: Featured in MAKE, Volume 09, page 62 noosphere.princeton.edu International Consciousness Research Laboratories (ICRL): Extending the discontinued Princeton Engineering Anomalies Research (PEAR) program icrl.org

This project first appeared in MAKE Volume 21, page 115.

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